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New records of smut fungi. 3

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Abstract — Three rare species of smut fungi are reported for the first time from the following areas: *Anthracoidea ortegae* from the Falkland Islands, *Entorrhiza casparyana* var. *casparyana* from Egypt, on a new host, *Juncus hybridus,* and *Haradaea moenchiae-manticae* from UK.

Key words — *Anthracoideaceae, Entorrhizaceae, Microbotryaceae,* taxonomy, *Ustilaginomycetes*

Introduction

In this article, records of three rare species of smut fungi, *Anthracoidea ortegae, Entorrhiza casparyana* var. *casparyana,* and *Haradaea moenchiae-manticae,* are reported from new localities. The collections on which these records are based were obtained during visits to the herbaria at the Royal Botanic Garden Edinburgh (E) and the Royal Botanic Gardens, Kew (K, K(M)) in May 2010.

Material and methods

Material from the herbaria of the Royal Botanic Garden Edinburgh (E) and the Royal Botanic Gardens, Kew [K and K(M)] was examined by light microscope (LM) and scanning electron microscope (SEM). For LM observations, the

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spores were mounted in lactophenol solution on glass slides, gently heated to boiling point and then cooled. The measurements of spores are given in the form: min–max (mean ± 1 standard deviation). For SEM, the spores were attached to specimen holders by double-sided adhesive tape and sputter coated with gold. The surface structure of spores was observed and photographed at 10 kV using a JEOL SM-6390 scanning electron microscope. The descriptions given below are based entirely on the specimens examined.

New records

Anthracoidea ortegae Kukkonen, in Roivainen, Karstenia **17**: 4, 1977. Figs 1–2

Specimens examined — On *Carex caduca* var. *ortegae* (Phil.) Kük.: **Falkland Islands,** West Falkland, Channel Hills, 1909–1911, leg. E. Vallentin (K 367 916); East Falkland, Darwin Harbour, 16 February 1908, leg. C. Skottsberg (K 367 906); East Falkland, Eliza Cove, Stanley Common, January 1938, leg. B.F., no. 49 (K(M) sine num.).

Sori in ovaries, scattered in the inflorescence, as broadly ellipsoidal or ovoid, black, hard bodies, 1.5–2 mm long, when young covered by a thin, whitish membrane; later becoming exposed but partly hidden by the glumes; mature sori powdery on the surface. Spores irregularly polyangular, sometimes with protuberances, in plane view 14–19.5 × 12.5–17.5 (16.9±1.1 × 15.2±1.0) µm (n = 100), in side view 10–12.5 µm thick, reddish brown; wall unevenly thickened, 1–2 (–2.5) µm thick, thickest at the angles, some spores with 1–3 indistinct internal swellings, some spores with light-refractive areas, verruculose.

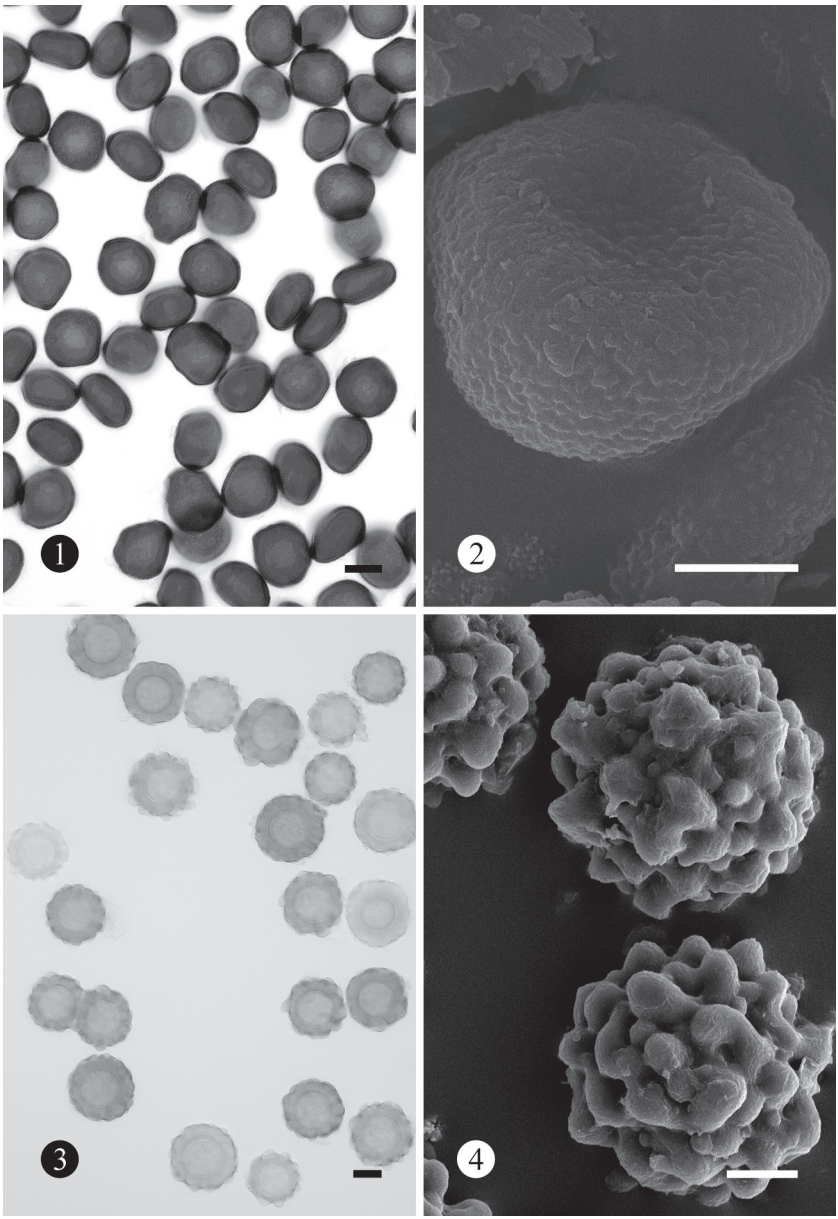
Distribution — On *Cyperaceae: Carex* (subgen. *Primocarex,* sect. *Unciniiformes*), South America (Argentina), South Atlantic Islands (Falkland Islands).

Comment — *Anthracoidea ortegae* was previously known only from the type locality: Argentina, Tierra del Fuego, Baliza, Ushuaia, 54°48' S, 68°12' W, on the same host plant (Roivainen 1977).

Entorrhiza casparyana (Magnus) Lagerh. var. ***casparyana,*** Hedwigia 27(9–10): 262, 1888. Figs 3–4

Specimen examined — On *Juncus hybridus* Brot. (det. G. Snogerup): **Egypt,** "prope Nafeh in Arabia", 16 May 1835, leg. W. Schimper (as *Juncus foliosus* Desf.), Unio itiner. 1835, no. 113 (E 352 462).

Sori on the roots forming elongated galls, filled with intracellularly developing spores. Galls 4–6 mm long, brown. Spore mass granular. Spores usually solitary, sometimes in pairs, globose or subglobose, 16.5–28 × 15–26 (21.9±2.0 × 20.6±1.9) µm (including ornamentation) (n = 100), occasionally some spores reach up to 32 µm in length, subhyaline, light yellow or yellowish brown; in LM, wall two-layered, the inner layer 0.5–1.5 µm thick, the outer layer variable in thickness (0.5–8 µm, including ornamentation); variable in ornamentation, tuberculate or verrucose.



Figs 1–2. Spores of *Anthracoidea ortegae* on *Carex caduca* var. *ortegae* in LM and SEM. Figs 3–4. Spores of *Entorrhiza casparyana* var. *casparyana* on *Juncus hybridus* in LM and SEM. Scale bars: 1, 3 = 10 μm, 2, 4 = 5 μm.

Distribution (of var. *casparyana*) — On *Juncaceae: Juncus alpino-articulatus* Chaix, *J. alpinus* Vill., *J. arcticus* Willd., *J. articulatus* L. (*J. lampocarpus* Ehrh. ex Hoffm.), *J. bufonius* L., *J. bulbosus* L., *J. caespiticius* E. Mey., *J. compressus* Jacq., ? *J. conglomeratus* L., *J. effusus* L., *J. geniculatus* Schrank, *J. gregiflorus* L.A.S. Johnson, *J. hybridus, J. inflexus* L., *J. planifolius* R. Br., *J. tenageia* Ehrh. ex L. f., *J. thomasii* Ten., Africa (Egypt, South Africa), Australasia (Australia, New Zealand), Europe (Bulgaria, Czech Republic, Denmark, including Faeroe Islands, Finland, France, Germany, Italy including Sardinia, Norway, Poland, Romania, Russia, Sweden, Switzerland, UK), North America (Canada) (Fineran 1978, Vánky 1994, Denchev & Minter 2008, Vánky & Shivas 2008). Records on four other hosts (*Eriophorum vaginatum* L. (*Cyperaceae*), *Juncus atricapillus* Drejer, *J. filiformis* L., and *J. squarrosus* L.) were treated by Fineran (1978) as doubtful or as later misinterpretations.

Comments — In Africa, *Entorrhiza casparyana* has been previously known only from South Africa. Explanations about the possible situation of the locality 'Nafeh', where this plant specimen (Unio itiner. 1835, no. 113) was collected, can be found in Kirschner et al. (2004: 374): "The locality 'Nafeh' was not safely identified. W. Schimper, from late March, 1835, collected plants in the region around the monastery of St. Catharina at the foot of Mt Sinai [Dayr al Qiddisah Katrina]. ... Nafeh is therefore expected to be in that region, too."

Entorrhiza casparyana var. *tenuis* Denchev & H.D. Shin differs from typical *E. casparyana* in the following two respects: shorter spores (11.5–20 (–21.5) µm long) and shorter sori (1.2–3 mm long while the typical variety possesses sori up to 15 mm long) (Denchev et al. 2007). It is distributed on *Juncus tenuis* Willd. and currently known from Korea, Austria, Romania, and Costa Rica. Four species of *Entorrhiza* are known on *Juncus: E. aschersoniana* (Magnus) Lagerh. (Europe, Central America, and New Zealand), *E. caricicola* Ferd. & Winge (Europe and New Zealand), *E. casparyana,* and *E. casparyanella* Vánky (New Zealand). A key to known *Entorrhiza* taxa on *Juncus* is given in Denchev & Minter (2008).

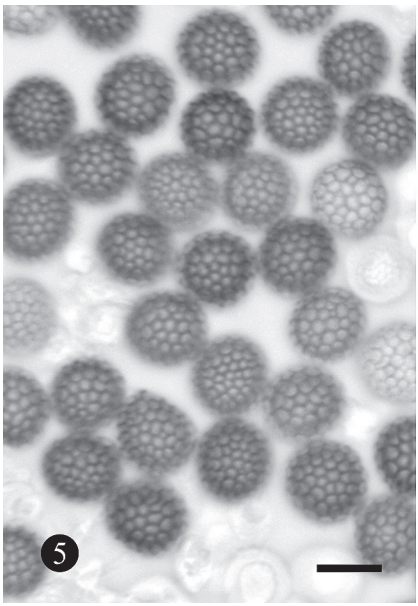
Haradaea moenchiae-manticae (Lindtner) Denchev & H.D. Shin, in Denchev et al., Mycologia Balcanica 3: 72, 2006. Figs 5–6

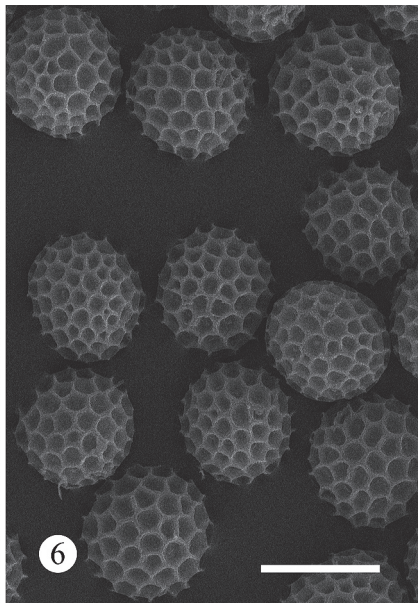
≡ *Ustilago moenchiae-manticae* Lindtner, Bulletin du Muséum d'Histoire Naturelle du Pays Serbe, Série B 3–4: 32, 1950.

≡ *Microbotryum moenchiae-manticae* (Lindtner) Vánky, Mycotaxon 67: 46, 1998.

Specimen examined — On *Moenchia erecta* (L.) P. Gaertn. et al.: **UK,** Wales, Montgomeryshire, Ffridd Faldwyn, 15 May 1998, leg. A. Jones (as *Ustilago* ? *duriaeana*) (K(M) 106 303).

Sori destroying the ovules and filling the capsules with powdery, purplish chestnut spore mass. Spores globose or subglobose, rarely broadly ellipsoidal, 11–15.5 × 10–13.5 (13.0±0.8 × 12.1±0.7) µm (n = 50), purplish brown; reticulate, 6–7 meshes per spore diameter, meshes irregularly polyangular (pentagonal or hexagonal), 1.2–2.7 µm long, muri (0.7–) 1.0–1.4 µm high; in SEM the meshes often with a hemispherical protuberance on the bottom.





Figs 5–6. Spores of *Haradaea moenchiae-manticae* on *Moenchia erecta* in LM and SEM. Scale bars = 10 μm.

Distribution — On *Caryophyllaceae: Moenchia erecta* (Bulgaria and UK), *M. mantica* (L.) Bartl. subsp. *mantica* (Romania and Serbia), Europe (Lindtner 1950, Vánky 1985, Denchev 1997).

Comment — *Haradaea moenchiae-manticae* is a new species for UK, as yet known only from a single locality in Wales. Though typically on *M. mantica,* the occurrence of this species on *M. erecta* has been previously reported from Bulgaria (Denchev 1997, as *Bauhinus jehudanus*).

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